



**State of Louisiana
Department of Natural Resources
Coastal Restoration Division and
Coastal Engineering Division**

**2004 Operations, Maintenance,
and Monitoring Report**

for

Clear Marais Shoreline Protection

State Project Number CS-22
Priority Project List 2

May 2007
Calcasieu Parish

Prepared by:

Mike Miller, Biological Monitoring Section (CRD)
And
Melvin Guidry, Field Engineering Section (CED)
LDNR/Coastal Restoration and Management
Lafayette Field Office
635 Cajundome Boulevard
Lafayette, LA 70506

Suggested Citation:

Miller, M. and Guidry, M. 2007. *2004 Operations, Maintenance, and Monitoring Report for Clear Marais Shoreline Protection (CS-22), Louisiana Department of Natural Resources, Coastal Restoration Division, Lafayette, Louisiana*



2004 Operations, Maintenance and Monitoring Report
For
Clear Marais Shoreline Protection (CS-22)

Table of Contents

I. Introduction.....	1
II. Maintenance Activity.....	3
a. Project Feature Inspection Procedures	3
b. Inspection Results	3
c. Maintenance Recommendations.....	3
i. Immediate/Emergency	3
ii. Programmatic/Routine.....	3
III. Operation Activity	3
a. Operation Plan.....	3
b. Actual operations	3
IV. Monitoring Activity	4
a. Monitoring Goals	4
b. Monitoring Elements	4
c. Preliminary Monitoring Results and Discussion	4
i. Habitat Mapping	
ii. Shoreline Position Data	
V. Conclusions.....	11
a. Project Effectiveness.....	11
b. Recommended Improvements	11
c. Lessons Learned.....	11
VI. Literature Cited.....	11



I. Introduction

The Clear Marais shoreline protection project area is located along the north bank of the Gulf Intracoastal Waterway (GIWW) in Cameron Parish between the Alkali ditch and Goose Lake (figure 1). The project provides features to protect 3,827 ac (1,531 ha) of freshwater marsh that are threatened by saltwater intrusion and marsh loss from breaches in the GIWW shoreline. Of the 3,827 ac of fresh marsh, 1,179 ac (472 ha) are vegetated marsh and 2,648 ac (1,059 ha) are open water, with the dominant marsh plant species including *Sagittaria lancifolia* (bulltongue), *Schoenoplectus californicus* (bullwhip), and *Juncus effusus* (soft rush).

The construction of the GIWW, which was deepened to its present depth of 12 ft (3.7 m) between 1942 and 1949, provided an avenue for high-action wave energy. This wave energy is increased during high-river stages in the Calcasieu-Sabine basin. The marshes located adjacent to the GIWW are protected from rapid fluctuations of water salinity and water level by a water management levee. However, increased tidal action and boat wakes threaten to create breaches in the levee that would connect the GIWW with interior ponds and marshes. The shoreline erosion rate of the north bank of the GIWW adjacent to the freshwater wetlands is 10 ft/yr (3.05 m/yr), based on aerial photography (USDA/SCS 1992). Additionally, the present rate of wetland loss in the project area is 1.1%/yr (USDA/SCS 1992). The susceptibility to saltwater damage and the erosional forces of the GIWW threaten the integrity of the remaining acres of the vegetated freshwater marsh.

The project design includes a 35,000 ft (10,668 m) rock dike along the north shore of the GIWW to protect the integrity of the Clear Marais freshwater wetlands north of the GIWW. Construction on the project was completed on 03/04/97.





Figure 1. Clear Marais Shoreline Protection (CS-22) project boundary and features.

II. Maintenance Activity

a. Project Feature Inspection Procedures

The purpose of the annual inspection of the Clear Marais Shore Protection Project (CS-22) is to evaluate the constructed project features to identify any deficiencies and prepare a report detailing the condition of project features and recommended corrective actions needed. Should it be determined that corrective actions are needed, LDNR shall provide, in the report, a detailed cost estimate for engineering, design, supervision, inspection, and construction contingencies, and an assessment of the urgency of such repairs.

An inspection of the Clear Marais Shore Protection Project (CS-22) was held on October 16, 2003 by Stan Aucoin, Dewey Billodeau, Garrett Broussard and Pat Landry from LDNR. The weather was partly cloudy and cool.

The field inspection included a complete visual inspection of the entire rock dike from water. Photographs were taken and a Field Inspection form was completed in the field to record measurements and deficiencies.

b. Inspection Results

The dike is in good condition. Approximately 4,000 to 5,000 linear feet of dike is below construction elevation. No apparent need for any maintenance at this time. Water level: 2.1'NAVD at the Black Bayou Cut-off.

c. Maintenance Recommendations

i. Immediate/ Emergency Repairs

None

ii. Programmatic/ Routine Repairs

None

III. Operation Activity

a. Operation Plan

There are no active operations associated with this project.

b. Actual Operations

There are no active operations associated with this project.



IV. Monitoring Activity

a. Project Objectives and Goals:

The objective of the Clear Marais Shoreline Protection Project is to maintain and protect approximately 35,000 linear ft (10,668 m) of management levee along the north bank of the GIWW that will contribute to protecting the integrity of the freshwater marshes of Clear Marais adjacent to the GIWW.

The following goal will contribute to the evaluation of the above objective:

1. Decrease the rate of shoreline erosion along the north bank of the GIWW south of the Clear Marais marshes through the use of a rock breakwater.

b. Monitoring Elements

The following monitoring elements will provide the information necessary to evaluate the specific goal listed above:

Aerial Photography:

To document land and water acreage and land loss rates in project and reference area, near-vertical color infrared aerial photography (1:12,000 scale) was obtained pre-construction in 1994 and will be obtained post-construction in 2006 and 2015. The original photography was checked for flight accuracy, color correctness, and clarity and was subsequently archived. Aerial photography was scanned, mosaicked, and georectified by USGS/NWRC personnel according to standard operating procedures (Steyer et al. 1995, revised 2000).

Shoreline Change:

To document shoreline movement, 35 shoreline markers were placed at points along the vegetated marsh edge adjacent to the rock breakwater at a maximum interval of 1000 ft (305 m). Five shoreline markers were placed at the same 1000 ft intervals 1 mi (1.6 km) west of the proposed breakwater in the reference area. The position of the shoreline relative to the shoreline markers was documented in 1997, 2000, and 2003. Future shoreline surveys will be documented in 2006, 2010, and 2015 by direct measurement. A GPS coordinate was obtained for each shoreline marker placed to maintain baseline condition over time. The shoreline was stratified into three different groups: Group A had mild erosion and was located east of Brannon ditch to the Alkali ditch, group B had moderate erosion and was located from the Brannon ditch to the end of the management levee and group C which had severe erosion from the end of management levee to directly adjacent to the Clear Marais wetlands. Determination of land types were made through evaluation of aerial photography.

c. Preliminary Monitoring Results and Discussion

Aerial Photography:

The 1994 land/water analysis indicated that project area had a ratio of 32.4% land to 67.6% water. The reference area had a ratio of 74.0% land to 26.0% water (figures 2 and 3).



IV. Monitoring Activity (continued)

Shoreline Change:

Data were collected in May 1997 (as-built), May 2000 and May 2003. The data indicate that after six years, the project has been effective in preventing erosion within each group (figures 4 and 5). Group A which was experiencing severe erosion prior to construction gained 1.89 ft/yr (.57m/yr) (table 1). Group B which was experiencing moderate erosion gained 3.02 ft/yr (.92 m/yr). Group C which was experiencing mild erosion gained 17.00 ft/yr (5.18 m/yr). Overall the project area gained an average of 7.66 ft/yr (2.33 m/yr) as compared to the reference area which is losing 9.10 ft/yr (2.77 m/yr).



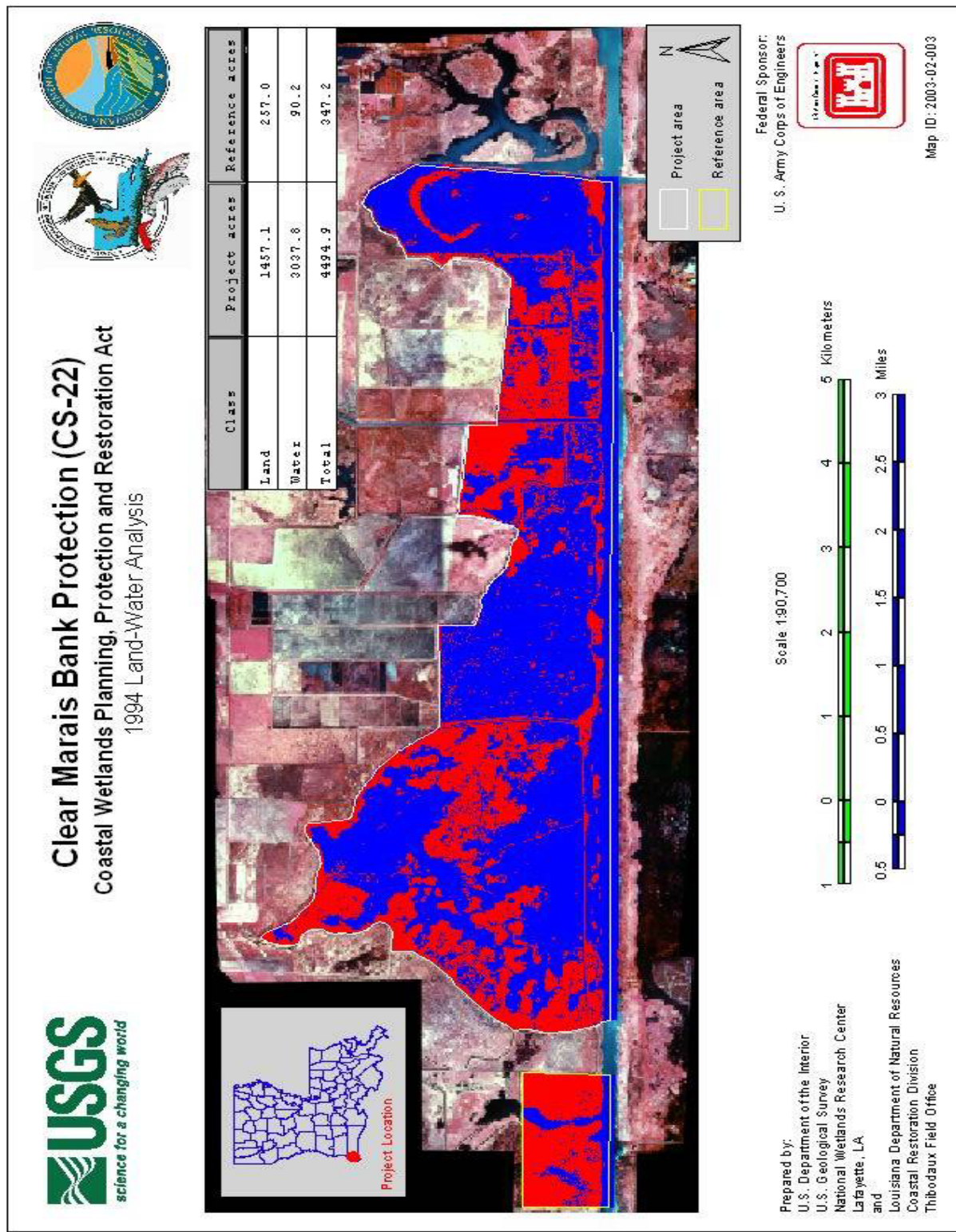


Figure 2. Land/water analysis of the Clear Marais Shoreline Protection (CS/22) project and reference areas from aerial photography taken on 11/07/94.

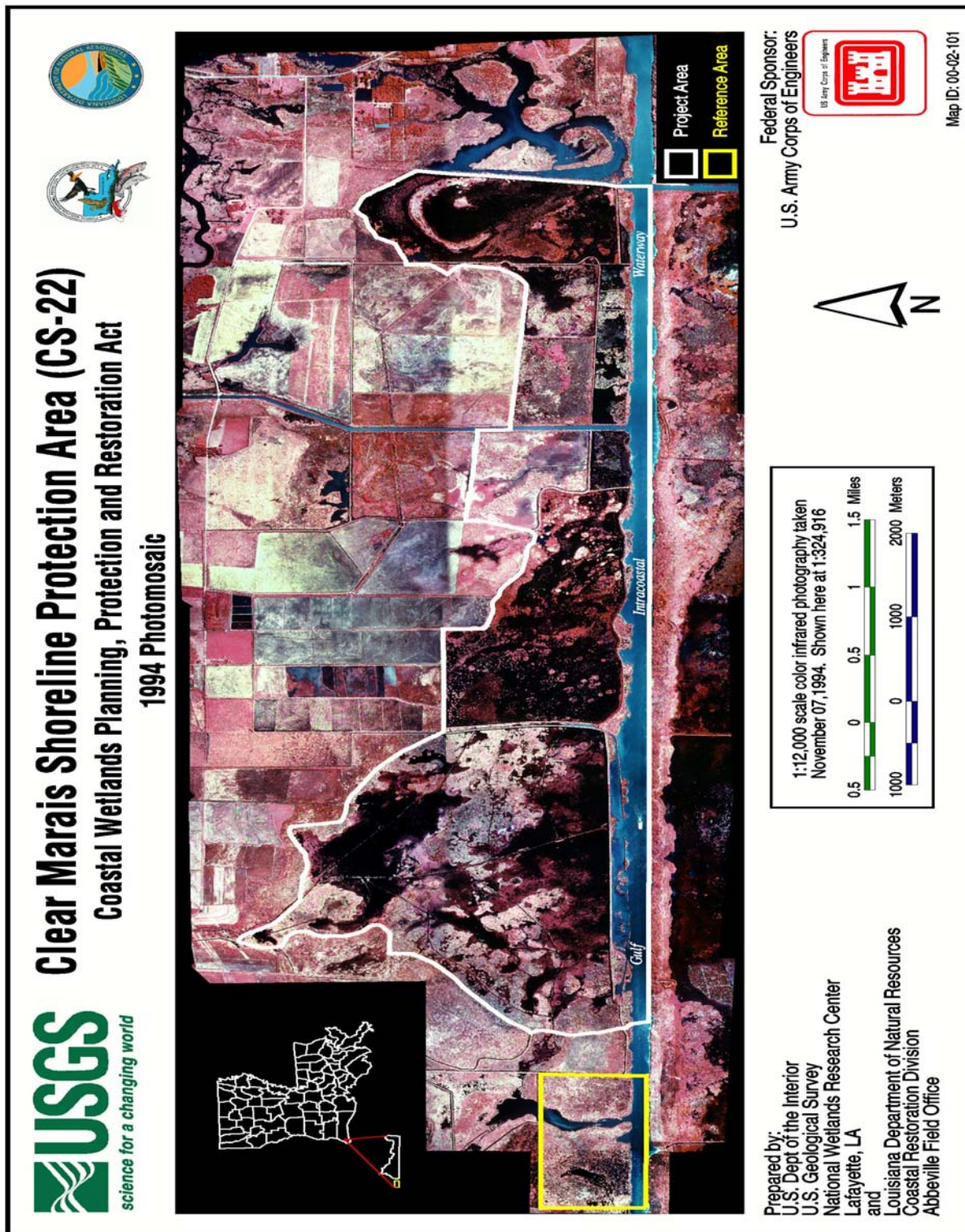


Figure 3. Photo-mosaic of the Clear Marais Shoreline Protection (CS/22) project and reference areas from aerial photography taken on 11/07/94.

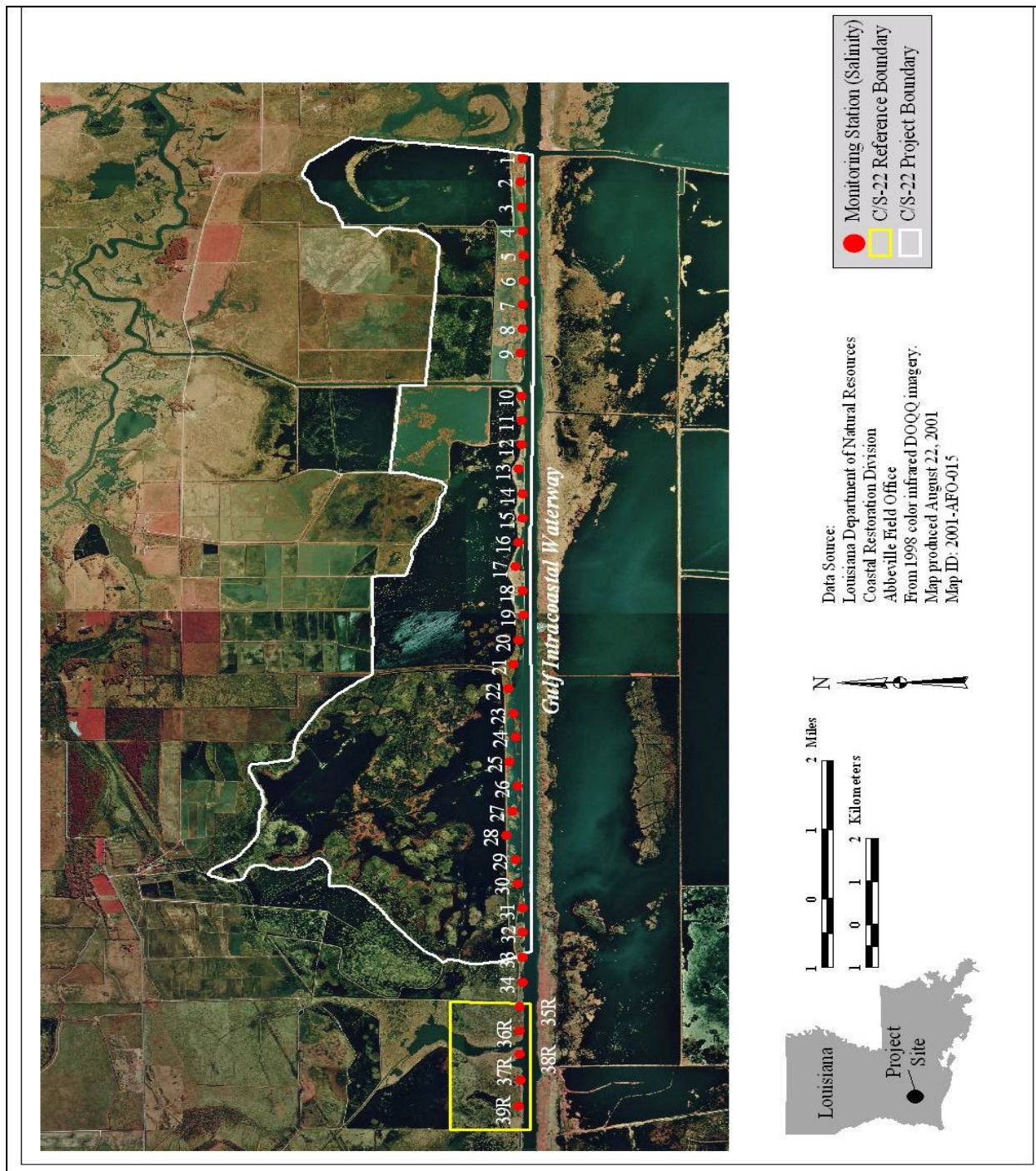


Figure 4. Project map showing the location of shoreline marker stations within the project (N=34) and reference (N=5) areas.

Table 1. 1997, 2000 and 2003 measurements in feet and meters from the survey hub to the vegetated edge of the bank within project and reference areas.

Station	Group	1997	1997	2000	2000	2003	2003	Total	Total
		Distance	Distance	Distance	Distance	Distance	Distance	Shoreline	Shoreline
		(ft)	(m)	(ft)	(m)	(ft)	(m)	Change	Change
CS22-01	A	53.99	16.46	55.76	17.00	5.90	1.80	-48.09	-14.66
CS22-02	A	38.99	11.89	127.92	39.00	104.77	31.94	65.78	20.06
CS22-03	A	93.98	28.65	137.76	42.00	90.68	27.65	-3.30	-1.01
CS22-04	A	60.98	18.59	59.04	18.00	50.09	15.27	-10.90	-3.32
CS22-05	A	25.99	7.92	6.56	2.00	6.80	2.07	-19.20	-5.85
CS22-06	A	25.99	7.92	26.24	8.00	6.50	1.98	-19.50	-5.94
CS22-07	A	49.99	15.24	52.48	16.00	6.60	2.01	-43.39	-13.23
CS22-08	A	49.99	15.24	42.64	13.00	28.99	8.84	-20.99	-6.40
CS22-09	A	98.97	30.18	100.36	30.60	95.88	29.23	-3.10	-0.94
CS22-10	B	29.99	9.14	22.96	7.00	23.09	7.04	-6.90	-2.10
CS22-11	B	92.98	28.35	88.56	27.00	86.48	26.37	-6.50	-1.98
CS22-12	B	95.98	29.26	75.44	23.00	13.80	4.21	-82.18	-25.05
CS22-13	B	159.96	48.77	160.72	49.00	159.56	48.65	-0.40	-0.12
CS22-14	B	42.99	13.11	39.36	12.00	31.49	9.60	-11.50	-3.51
CS22-15	B	22.99	7.01	13.12	4.00	10.40	3.17	-12.60	-3.84
CS22-16	B	127.97	39.01	131.20	40.00	113.17	34.50	-14.80	-4.51
CS22-17	B	205.95	62.79	203.36	62.00	188.55	57.49	-17.40	-5.30
CS22-18	B	53.99	16.46	52.48	16.00	52.69	16.06	-1.30	-0.40
CS22-19	B	23.99	7.32	16.40	5.00	6.10	1.86	-17.90	-5.46
CS22-20	B	151.96	46.33	154.16	47.00	139.26	42.46	-12.70	-3.87
CS22-21	B	272.93	83.21	272.24	83.00	276.93	84.43	4.00	1.22
CS22-22	B	445.89	135.94	N/A	N/A	388.40	118.41	-57.49	-17.53
CS22-23	C	532.86	162.46	429.16	130.84	409.50	124.85	-123.37	-37.61
CS22-24	C	554.86	169.16	462.48	141.00	115.37	35.17	-439.49	-133.99
CS22-25	C	389.90	118.87	328.00	100.00	307.92	93.88	-81.98	-24.99
CS22-26	C	47.99	14.63	145.52	44.37	135.27	41.24	87.28	26.61
CS22-27	C	502.87	153.31	256.62	78.24	252.64	77.02	-250.24	-76.29
CS22-28	C	498.87	152.10	463.47	141.30	318.92	97.23	-179.95	-54.86
CS22-29	C	179.95	54.86	137.51	41.93	113.17	34.50	-66.78	-20.36
CS22-30	C	396.90	121.01	383.48	116.92	253.34	77.24	-143.56	-43.77
CS22-31	C	26.99	8.23	10.22	3.12	6.20	1.89	-20.79	-6.34
CS22-32	C	37.99	11.58	44.19	13.47	37.09	11.31	-0.90	-0.27
CS22-33	C	30.99	9.45	28.27	8.62	21.19	6.46	-9.80	-2.99
CS22-34	C	11.00	3.35	9.74	2.97	6.60	2.01	-4.40	-1.34
CS22-35R	R	0.00	0.00	-33.80	-10.31	-91.97	-28.04	-91.97	-28.04
CS22-36R	R	0.00	0.00	-44.32	-13.51	-102.76	-31.33	-102.76	-31.33
CS22-37R	R	0.00	0.00	-111.34	-33.95	-89.87	-27.40	-89.87	-27.40
CS22-38R	R	0.00	0.00	-28.86	-8.80	-27.49	-8.38	-27.49	-8.38
CS22-39R	R	0.00	0.00	N/A	N/A	N/A	N/A	N/A	N/A



CS-22 Clear Marais
Shoreline Position Change 1997-2003

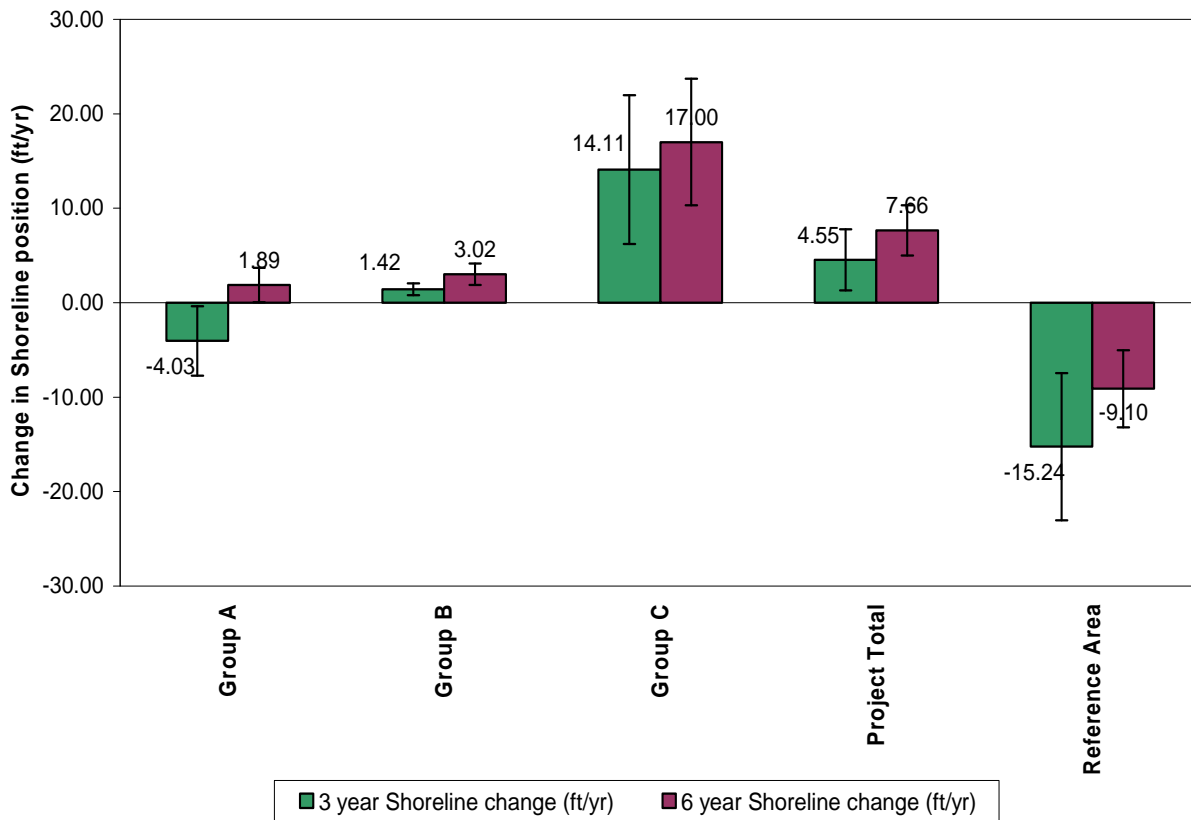


Figure 5. CS-22 Shoreline position change within each group, project and reference area from 1997-2003. 1997–2000 represents the 3 year shoreline change (ft/yr) and 1997–2003 represents the 6 year shoreline (ft/yr) change.



V. Conclusions

a. Project Effectiveness

The data indicate that after six years, the project has been effective in preventing shoreline erosion within each group, Group A which was experiencing severe erosion, Group B which was experiencing moderate erosion and Group C which was experiencing mild erosion. Overall the project area gained an average of 7.66 ft/yr (2.33 m/yr) as compared to the reference area which is losing 9.10 ft/yr (2.77 m/yr). Visual observation indicates vertical accretion of the wetland area at many locations between the foreshore rock dike and the shoreline

b. Recommended Improvements

A structural assessment survey performed by a licensed engineering/land surveying firm is recommended to evaluate settlement and stability of the rock structure along with any evidence of accretion on the land side of the rock structure.

A GPS secondary monument is required within the project area.

c. Lessons Learned

Increase the spacing between settlement plates from 1000 ft to 2000 ft for future monitoring of foreshore rock dikes.

Based on multiple O & M inspections, the foreshore rock dike has proven to be very effective in reducing shoreline erosion along the GIWW, while experiencing no deterioration and requiring no maintenance.

VI. Literature Cited

Steyer, G. D., R. C. Raynie, D. L. Steller, D. Fuller, and E. Swenson. 1995, revised 2000. Quality management plan for Coastal Wetlands Planning, Protection, and Restoration Act monitoring plan. Open-file series 95-01. Baton Rouge: Louisiana Department of Natural Resources, Coastal Restoration Division.

U.S. Department of Agriculture, Soil Conservation Service. 1992. Wetland Value Assessment, Alexandria, LA.: Soil Conservation Service.

